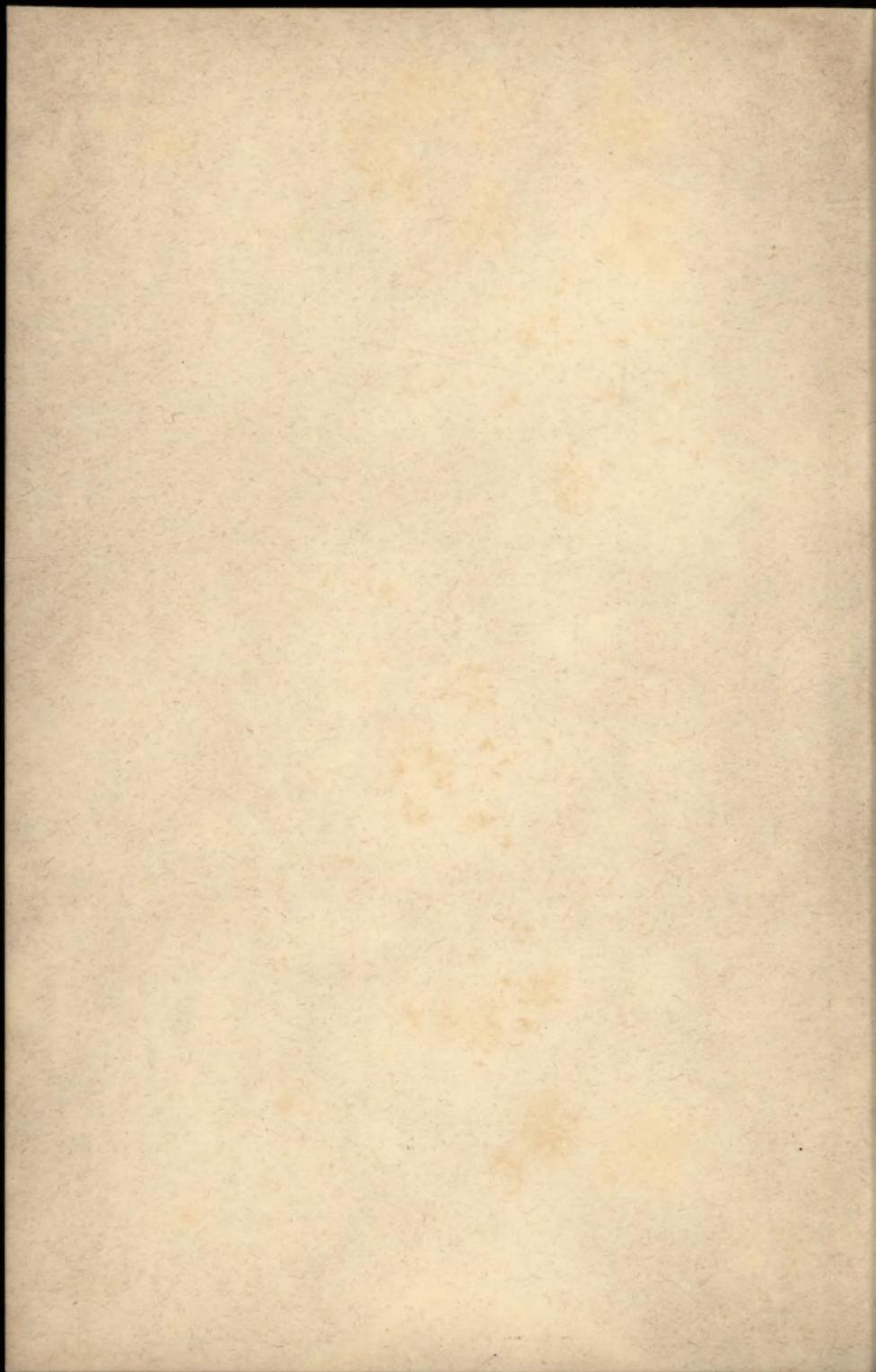


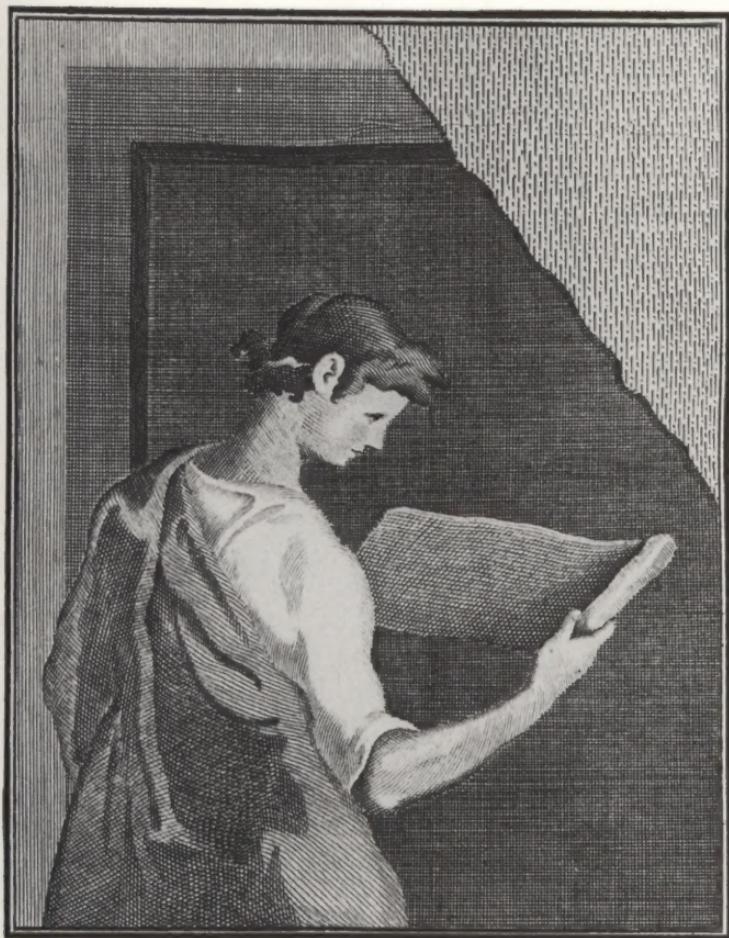
THE PRESCRIBERS GUIDE  
TO THE  
HARROGATE MINERAL WATERS

BY  
H. J. JOHNSTON-LAVIS

M. D., M. R. C. S., B. ès Sc., F. G. S.

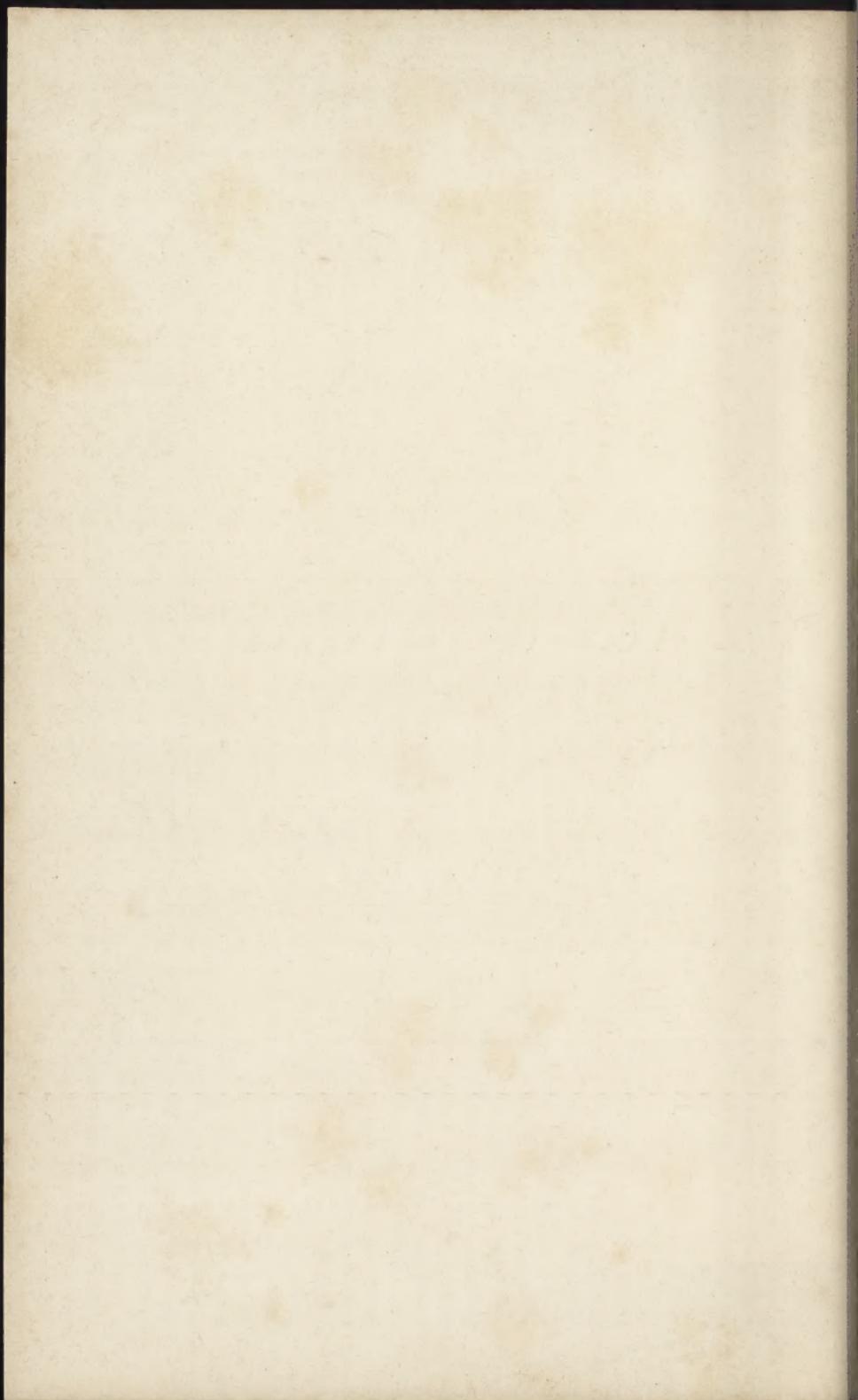
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BY  
H. J. JOHNSTON-LAVIS

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## P R E F A C E

This little book is intended to place before the busy practitioner the general principles and salient facts to be considered in directing his patients to Harrogate Spa. A spare hour will be sufficient for him to peruse this volume and to glean from it what be is likely to require his attention drawn to. In the endeavour to keep it within such narrow limits, all details and references had to be excluded; where fuller information is desired, larger treatises may be consulted. With one or two exceptions, no originality is claimed, but every effort has been made to keep the argument out of the groove of the romantic hypotheses and superlative statements, often associated with the water cure.

My best thanks are due to Mrs L. Wolffsohn and Dr. C. Read for looking over the proof-sheets.

H. J. JOHNSTON-LAVIS

7. CHIATAMONE. NAPLES, ITALY

(*In Winter*)

10. CAMBRIDGE CRESCENT

HARROGATE, C.

(*In Summer*)



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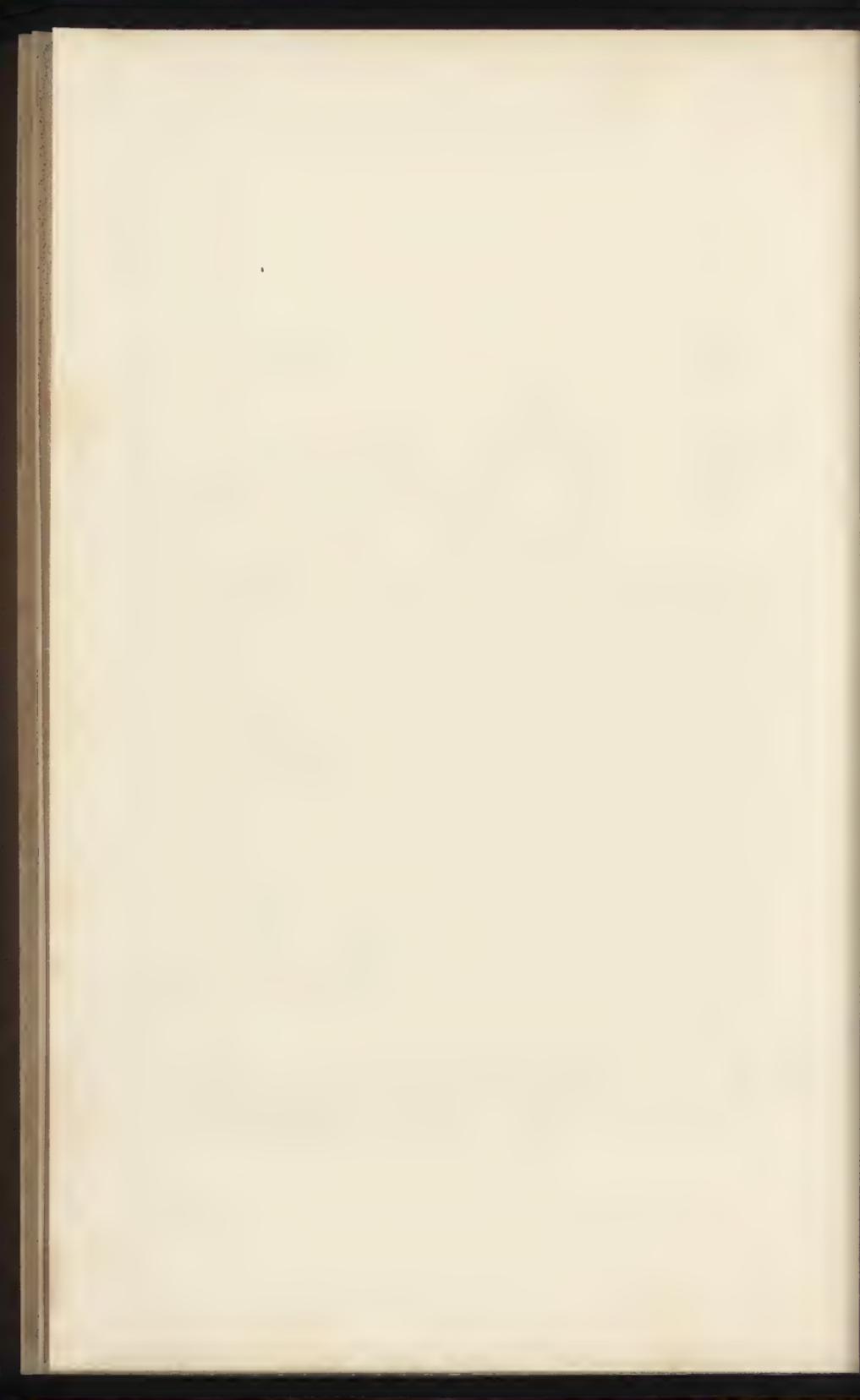
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## CHAPTER I.

### INTRODUCTION

For an English physician, who has travelled through the continent, there is hardly anything more striking than the extreme neglect of hydro-therapeutics by his home colleagues. This assertion not only refers to ordinary cases that are met with in the general run of practice, but to those patients who are obstinate and advanced examples of morbid processes, beyond the reach of routine medical treatment, or where this is inapplicable in consequence of some other complication.

Still more extraordinary is the existence of this state of things in a country that is unique in the production of sufferers from gout and rheumatism. We should naturally expect that the treatment by mineral waters would be universal in great Britain, giving, as it does, by far the best and more permanent results, with least damage to the system, in consequence of its aiding some of the natural physiological processes, whilst removing

impediment to the full action of, and burdens upon, organs that are at a deadlock. Above all, however, such treatment practically introduces no substances foreign to the animal economy.

This ignorance of, or often disdain, for such methods is principally due to the absolute neglect of any teaching of the subject in our medical schools and in our text books. When I look back and add up what I or my fellow students knew of mineral waters and their uses when we were *duly qualified*, I feel absolutely shocked at the diminutive sum total of our acquaintance with the subject.

That healthy disgust that the British practitioner has for any special *-pathy* ushered forth by speculators, medical or otherwise, with a figurative flourish of trumpets little better than the proclamation of the wonderful curative properties of Sequah or St Jacobs Oil, often leads him to distrust any therapeutic method outside routine practice.

Another outcome of this state of things, is the idea that the mineral waters of England are of little value and far inferior to those of the continent.

When some of our British colleagues can do no more for their patients, they send them off to Carlsbad or Kissingen, Aix-les-Bains or Spa, without

sufficiently considering whether these places are suited to their cases or not, from a climatic point of view, and absolutely regardless of the sanitary condition of such spas.

Some years since, I made a tour of the English watering places, almost as a matter of curiosity, when, to my no inconsiderable astonishment, a closer acquaintance with Harrogate showed me that it possessed a collection of mineral waters not approached by any locality in England, and only surpassed by one in Europe, viz: the volcanic district of Naples.

A combination of circumstances such as a dozen years residence amidst the thousands of thermo-mineral springs of Naples and of Southern Italy and Sicily; some thirty journeys across Europe, taking in many of its great spas, trips to Saratoga, the solfataras, geysers and hot springs of Iceland, gave me data by which to estimate Harrogate and its waters.

Harrogate does not possess everything, or every advantage, for no place ever will, but it certainly has few rivals; and it is therefore the duty of every British medical man to be acquainted with those advantages for the use and benefit of his patients, instead of sending them to inferior foreign resorts, where the hygiene, diet, language, long railway

journies, and many other objections present themselves.

This little pamphlet is intended to present to the busy practitioner, in as concise a manner as possible, the main points about a mineral water station, such as the one under consideration, and the principal cases suitable for sending to be treated there. It is not proposed, however, to compete with the other more extensive works treating of that locality, which should be referred to where more detail is required.

## CHAPTER II.

### THE PRINCIPLES OF HYDROTHERAPEUTICS

Mineral waters may be considered as dilute solutions of different gases, salts, etc. in water. It is this solvent, water, which acts externally as a mechanical agent upon the skin, and a vehicle for the substances dissolved in it, that are thus able, when used as a bath, to penetrate some distance through the epidermis and possibly even into the body. When mineral waters are drunk, the solvent again plays the part as a vehicle for the action of the salts, etc. upon the mucous membrane of the alimentary canal, but, in addition, the water itself is a most valuable therapeutic, or perhaps more correctly, physiological agent. This last fact is very frequently overlooked in crediting this or that compound contained in a mineral water, when in reality it is the water itself that did the work.

Here let me make a remark patent to many of my readers. There are numerous patients who will steadily and patiently consume some mineral water with a nasty taste and an elaborate anal-

ytical table on the ticket of the bottle, who would simply scorn to drink the same amount of distilled water in the twenty four hours, although the latter might be the more beneficial of the two.

Personally, I look upon the water as the primary and most important therapeutic agent of all mineral waters, and the first the action of which must be considered. As water is the most important agent in animal and plant life, as it is the medium in which all the chemical reactions and tissue-changes that take place in the body, are carried on; it is a substance better tolerated than any other, whilst large quantities of it are daily absorbed and excreted. It therefore constitutes the best tolerated of all chemical compounds, it is harmless in the largest doses, whilst many other drugs are injurious in the smallest quantities. Some litres of water, more than is requisite, can be driven through the system daily for long periods, without any injury to the health, and very frequently with most beneficial results. In morbid states of the body most marvellous effects can often be brought about by simple water-drinking. The difficulty of applying it in its pure state so as to satisfy the minds of incredulous patients, is one of the many reasons for our resorting to the mineralized waters.

If to this remarkable action of pure water we can add that of certain sulphides, chlorides,

sulphates and carbonates of alkalies and alkaline earths; with iodides, bromides, and arsenic, we have medicaments of very great value. The use of many of these substances in a concentrated form, such as usually prescribed in ordinary treatment, is often attended with serious inconveniences, whereas a large dose, highly diluted, presents no ill effects. The absorption is slower, more continuous and prolonged, and the same vehicle that so favourably introduced the salt or gas into the system, is there ready to remove it if necessary.

I have frequently found this in patients who have been long under treatment of iodides, intended as an absorbent, but with hardly any effect until it has been combined with large doses of some indifferent mineral water, when the action of this same drug has been magical, hard deposits disappearing in a remarkably short time, whilst there is less danger of atrophy of healthy organs, and that dreadful, often suicidal, depression is far less marked. The same applies, though I think in a less degree, to mercury. Still more is this the case where the skin is further stimulated to act by douches, hot air, vapour or ordinary baths.

The same argument holds good when we consider the action of mineral waters as applied externally. Here the solvent plays more a physical than a chemical part. By acting on the vasomotor nerves,

and thus on the capillaries as well as the lymphatics, by reflex action on the secretory organs of the skin and also its trophic nerves, certain revulsive changes are set up. These changes depend naturally upon temperature, and mechanical action as by bathing, needle, spray, douche baths, etc. and much upon length of application. Coincident with the soaking of the skin, the substances dissolved in the water penetrate to its deeper portions and exert their therapeutic, antiseptic or parasiticidal effect in a far more satisfactory and complete manner than by paints, ointments, liniments, and other, often obnoxious, external medicaments.

Let it be fully understood I do not for one moment deprecate the use of such medicinal agents, which are often most valuable or necessary in the intervals of bathing.

Over and above the multitudinous methods of using mineral waters for baths or drinking purposes, their use as sprays to the throat and nose, as enteroclysms, for washing out the stomach, etc. are, though of less importance, not to be forgotten. Their use in these various ways may often be combined with calomel, arsenic and other mineral vapour baths, with massage, electricity, inunction and so forth, with marked advantage.

## CHAPTER III.

### MINERAL WATER STATIONS AND THEIR USES.

A frequent question, but too well known to all of us, is whether mineral waters may not be taken at home. Our answer must be rather a long and detailed one. So far as drinking goes there is no reason in many cases why the pure therapeutic effect should not be the same at home as at the springs. But a very large number of mineral waters, when withdrawn from their source, rapidly change. There were two such examples at Harrogate, and although a method has been devised for preventing the decomposition of one, numerous essays of all kinds by skilled chemists has failed with the other. This decomposition is particularly marked in the case of sulphur waters, probably from the reaction with metallic bases in the glass; in the same way many iron waters are very unstable.

Bathing, douching, and any method of using large quantities of mineral waters is of course precluded from being carried out at home by the

question of expense, whilst the same difficulties in the keeping of waters in their normal state applies equally here as in the former case.

Mineral waters are also not only applied as direct therapeutic agents but they are often employed to bring about a revulsion. This latter object is the real basis of *hydropathy* as distinguished from the more wide-reaching hydrotherapeutics of which it is but one important, though, as a system, a lop-sided and unscientific branch of the latter.

Physiologically we may look upon a revulsion as simply a violent stimulation of all organs of absorption, secretion, and above all of excretion, whilst any chronic strain upon one part of the human mechanism is relieved, and the functions of the organ are put into a state of equilibrium by excessive stimulation of the others. In fact the process is analogous to counter-irritation over a large area.

But one of the most important factors in the cure is change, which may be well illustrated by the following extreme type case. Mr A. B. is a busy merchant. He was born of parents with a little rheumatic and tubercular history. In early life he suffered all the usual routine diseases of childhood, including a little dropsy after scarlet fever, rheumatic pains brought on by wet feet, and had a few

enlarged glands which under treatment disappeared. As a young man some years were spent in "enjoying himself" with a few "accidents" not of a serious nature. He occasionally was thoroughly overcome by liquor, but more frequently absorbed very considerable quantities without being intoxicated. Since settling in business, trading operations have always been lubricated by nips of beer, port, sherry, champagne or spirits, according to circumstances. He of late years rises at 9 a. m. goes straight down to a heavy meat breakfast, served near a roaring fire for 9 months in the year, impedes his digestion by hurrying a little for his train, and later by smoking and reading his newspaper on his journey to town, and finally by a fair share of unpleasant letters, and affairs that must occur every day at his office. At 11.30 he takes upon a still filled stomach "something" to give him an appetite for lunch, which follows after a cigar or two at 1. p. m. and consists of two or three courses quite sufficient for any ordinary man's dinner. With this is consumed half a pint of claret followed by nips of brandy and a cigar. After two hours more of business and attendant excitement of market changes and other worries, he goes to the railway station, where another nip is taken on his stomach, still unemptied and unrested.

Another train journey, a strol in his garden or a chat indoors and then comes "dinner" of some half dozen or more courses, with several wines, followed by a cigar or two. At 8 p. m. tea and biscuits are probably poured into the stomach, or perhaps a game or two of billiards in a smoke-choked atmosphere, with brandy hot, is indulged in. In all cases at 11. p. m. a whiskey and water nightcap finishes the day. His stomach, kidneys, skin and lungs have born uncomplaining this tyranny for twenty years. Some two years ago he lost his wife or his favourite son, his daughter wants to marry a "beggar"; Argentine or Portuguese funds have gone down; something went wrong with the drains in the house, he got wet once or twice, and finally a cold brought on an attack of gout; he was drugged with colchicum, iodides, etc. with temporary relief, but a little eczema appeared; he feels his "liver" is out of order, and his cutaneous capillaries are dilated.

No special organ shows much marked alteration but most are physiologically injured, whilst his joints are all a little stiff at times, and this, combined with a corpulency, which appeared at 30 instead of 40, prevents his taking the small amount of exercise he used to. Finally he "breaks down" and after most heroic, though none the less skillful treatment, which is only in part effectual, he is

dispatched to some mineral water station as a last resource.

Here he is ordered a rational diet, abstinence from almost all alcoholic liquors and sweets, and the amount of farinaceous food is reduced. He has to rise earlier of a morning, walk to the pump room, and drink several ounces of say saline sulphur water which is absorbed before he gets back to his lodgings or hotel. He then eats a reasonable breakfast, which he is able to digest during a quiet chat or stroll in the garden. At 10 or 12 he takes his Turkish or warm sulphur bath, or probably a needle or an Aix douche with a liver pack, followed by another draught of mineral water, and after a short walk returns to his lunch. The afternoon slips on pleasantly in the gardens, at 4 or 5 p. m. another walk to the pump room and back for another draught of mineral water prepares him for his dinner. A few hours pleasant chat, possibly a game of billiards, chess, whist, or a concert whiles away the evening till 10 p. m., when he retires to rest.

His special symptoms are treated by a practical medical man, and as his limbs get more supple, his exercise is increased by riding, bicycling, walks or lawn tennis, etc.

During this treatment he is placed in a more healthy atmosphere than that of a crowded town,

dirty and dingy offices, over carpeted, curtained, and heated rooms. The hurry-scurry and worry of every day business life is replaced by calm and pleasant chat with new acquaintances, so that after a few days the feeling of the absolute incapability for any other living man to look after his business wears off. At the end of from one to three months he regrets leaving his cure, which at first appearing to him a troublesome ceremony, has now assumed the character of a pleasant holiday. The morbid processes that were destroying him have been arrested, and those overstrained organs have been reposed by the relief or diversion of the strain upon them. His dyspepsia has gone, his «liver» acts well, his joints have lost their rust, his capillaries have returned as far to their normal state as the permanent tissue change will allow, the brain has been rested, whilst all the tissues are now bathed by a stream of blood no longer charged by abnormal constituents, partly oxidized food-stuffs, and an excess of excretory substances.

Let us take one more picture. Miss X. Y. is the daughter of middle class parents; her father lives rather highly, has a little rheumatism and one or two cases of consumption in his family, whilst her mother, a good but weak-minded woman with an excessive religious turn of mind, is “nervous” or more properly unstable, full

of prejudices, excessively mock modest, fond of her principal occupation of routine afternoon calls amongst her equally "banal" acquaintances.

This mother has also one or two tubercular cases in her family, besides a little mental and alcoholic taint. Miss X. Y. was, at a few weeks old, partly fed on some much advertized wonderful baby food, with the result that unrecognized infantile dyspepsia and intestinal catarrh had taken a chronic hold of her before she was one year old. Most of the food given had been sweetened so that at an early age the child had already developed the perverted appetite for sugar, which, in a more or less refined form during the next 17 years she is allowed to indulge in freely. This has kept up the gastric feebleness, so that her bad appetite is permitted to be stimulated by condiments, vinegar, pickles and other diabolical preparations, which, as age advances, constitute an important part of her meals.

In earlier years she has been much coddled, fed partly on new (probably tubercular) milk; she has had her "glands swollen", chronic enlargement of tonsils, frequent attacks of anæmia, which her medical adviser has from time to time treated with quinine and iron or some similar preparations.

Her studies have been badly directed, so that French, German, Music, drawing and other ac-

complishments which she is supposed to have acquired, but of which she knows very little, and that badly, has prevented her from learning common sense and a little elementary science. The small amount of time left her for recreation is passed in dancing lessons in a dusty room, or at the best a sedate walk, because her *wise* mother finds that any exercise likely to develope her chest capacity or bones and muscles, is really too vulgar and tomboyish. In her early years stays have been applied, "but oh! no, never in the least tight, only to fit her well and improve and mould her figure" and to prevent its development! All this with her inactive life, chronic gastro-intestinal catarrh, leads to constipation, which is maintained frequently so as to become a bad habit by that peculiar mock-modesty or false modesty mimicked from, or impressed upon her by her mother. She is constantly sent to Church twice or thrice on Sundays instead of having a day of rest in the open air from the burden of the school room or the study. She is catechised until her melancholy gives way under the influence of it, so she flies to her only resources of distraction, that of exciting romance, to which such a girl inevitably resorts. Her interest, intelligence or reasoning power has never been developed, so that as she grows up her sole object in life is to find a husband, whom her

good mother looks upon as a means of keeping her in idleness for the rest of her life. Her *literary* studies have developed absurd romantic ideas ending in an equally stupid attachment, nipped in its bud by her watchful parents. She frets, takes less exercise, pretends to have a feeble appetite at meals, but constantly nibbles something in the interval. Her chronic anaemia, before hardly distinguishable, now augments at a rapid rate, the resulting feeling of weakness leads her to a still more sedentary life, her already slightly perverted appetite fails, and her diet is always a selection of the most piquant and most unwholesome dishes on the table.

Every imaginable preparation of iron and other tonics are given her, only adding to the increasing constipation, so that auto-infection and the degeneration and non-production of the red blood corpuscles goes on apace.

Menstruation has disappeared in consequence of malnutrition of the ovaries and uterus, but the patient's mother and friends take the result for the cause and *ill-treat* her accordingly.

As a final resource she is sent to some such watering place as Harrogate. Now a regular course of hygiene, combined with plenty of exercise in the bracing moorland air, aids a course of saline iron waters such as the "Kissingen" or other springs

that occur there. The patients bowels are gently but regularly cleared out by the salines, and disinfected and toned by the iron. Any sulphuretted hydrogen and sulpho-organic compounds are decomposed by the iron and prevented from being absorbed into the circulation, so insuring the formation and action of the red corpuscles, whilst the resulting partially individualized protoplasm can no longer leak away by the kidneys, producing as it did slight albuminuria. More salines circulate in the blood, helping general metabolism, and the clearing and restoration of gland action, whilst the little iron that is absorbed acts as a tissue food.

In a few weeks the waxen skin and languid countenance has given place to a healthy pink complexion and an expression of vivacity and beaming smiles. The sufferer is restored to health so far as permanent injuries and defects during her growth will allow. She returns to her home, and follows a more reasonable and regular life, or if not, probably morbid processes act in another direction.

It has been said that could we write our prescriptions on bank notes, we should cure half the diseases that torture humanity; but if we could write prescriptions — and be obeyed — for more reasonable modes of living, physically, morally and

intellectually, we should prevent nine tenths of disease, and should hardly require mineral-water stations.

Similar pictures could be drawn of the scrofulous child, the menorrhagic or neuralgic woman, the sufferers of all kinds of skin deseases, hypochondriacs, the convalescents from grave illnesses, tropical fevers, mental breakdowns, loafers, etc., who often as a last resource are sent off to take the waters.

## CHAPTER IV

### HARROGATE AS A MINERAL-WATER STATION

Bearing in mind the above observations, it is evident that the locality which can fulfil the requirements of climate, variety of springs, good drinking water, drainage and general hygiene, beauty of scenery and locality, to the largest extent, will constitute the best spa or mineral water station. No locality can excel in all these factors, but few if any can surpass Harrogate for a remarkable combination of many natural and acquired advantages of this nature. An exile in winter for many years from England in consequence of hereditary gout and rheumatism, it was after a cool and deliberate examination of numerous mineral-water stations that I selected Harrogate, as in my own judgment one of the most perfect.

The situation of the town on a moorland plateau with a small portion in a well sheltered valley, and many miles from the sea, renders its climate bracing, exhilarating and remarkably dry during the summer months. Its climate has therefore

many of the advantages of mountain regions, but without the disadvantage of the lower barometric pressure of high altitudes, which too often upsets people, causing insomnia, headache, etc. The advantage of this in rheumatism, gout with dyspepsia, as well as in the different anaemias, marasmus, debility from long illnesses, etc. is remarkable and is fully confirmed by the results as seen in those who resort to it. Where greater stimulation is required, invalids should be sent to central and high Harrogate, where there is always a breeze, whilst the more sensitive, especially convalescents, neuralgics, etc. will be better off in lower Harrogate, which being in a valley, is protected from the direct action of the wind. Perhaps one of the most striking proofs of the healthful climate, as well also of the good water supply and drainage, is the remarkably low death rate, which for a period of seven years, during the decade 1880-1890 averaged 13.7 per thousand, with a maximum of 15.5 and a minimum of 11.7. This is all the more remarkable, when we remember that a large proportion of the residents have only taken up their abode there late in life, having passed the greater part of their days in unhealthy manufacturing towns and stuffy offices, or tropical climates, whilst not a few are invalids who go there to eke out their remaining existence.

There are no sources of pollution to the air such as factories, chemical works, etc. there being no industries in the town, whilst even the gas works are near upon a mile distant

Neither do there exist any dirty streets, poor crowded quarters or agglomeration of misery of any kind, to act the part of a hot-bed of infection. This fact, in conjunction with the perfect water and drainage, have acted as impregnable bulwarks against such diseases as typhus, cholera, and above all that scourge of modern civilization—typhoid fever. Strangely, even influenza here assumes a very feeble invasive power and benign form. This places the town in a remarkable pre-eminent position for healthiness in comparison with most of our sea-side watering places, and far above all continental health resorts.

Perhaps no better proof of its healthiness can be found than in the rapid increase of residents which has been within a few years quite phenomenal.

The rapid growth of the town might become injurious, were it not for a large piece of land of 200 acres, open to the public, called the Stray, which in the form of a very irregular **S**, divides the town, embracing the two main parts of it in a broad strip of grass and trees. A very large proportion of the houses are, if not surrounded,

backed and faced by gardens; the streets are broad and many areas exist which, although not acting as purifiers to the air, add no polluting material to it, whilst aiding the dilution of impure emanations, from chimneys and lungs.

Perhaps above all things it owes its low death rate to the remarkable absence of any poor quarters with the dirt and squalor attendant thereon, which constitutes the culture medium for most of the zymotic diseases, and favours infantile mortality.

Next to this, the water supply is undoubtedly of great importance. At Harrogate this is derived from the sandstone rock underlying the neighbouring districts of open country and free from sources of pollution. It is peculiarly soft, as is the case with most sandstone waters, it is carefully stored, aerated, filtered and delivered to the inhabitants in a highly commendable way.

In like manner the drainage is well carried out and is conducted down a valley below the level of, and at some distance from the town, where it is utilized on a sewage farm.

Finally most of the residents are not natives, but having removed to Harrogate for the sake of their health, are just the class of people whose minds are diverted to the question of hygiene, see with jealousy any attempt to break the

laws of sanitation, and follow up any such offence by prompt and energetic action to prevent or remove the danger.

By far the greatest part of the town is situated on sandstone and other highly permeable rocks, so that there is very efficient subterranean drainage, and the gentle slopes allow of a rapid discharge of surface water in heavy storms. These conditions in conjunction with the distance of Harrogate from the west coast with intervening heights that condense much of the moist winds from the Atlantic, renders its climate much dryer and sunnier than most places to the west. Its elevation likewise relieves it from the mists of more lowly situated towns, such as York, Leeds, etc. In consequence of these special topographical conditions its climate is characterized by having one of the lowest averages of rainfall of Great Britain and more sunny days than most other localities. Of course while this improves it very much as a summer resort, it renders, the climate rather bleak in the winter, but though then cold, it has the advantage of being comparatively dry.

In so far as distractions and amusements go, Harrogate is well favoured. This is especially the case with regard to pleasant walks as well as longer excursions, which can be made through beautiful country to so many points of picturesque

scenery and interesting ruins in the neighbourhood. These excursions are greatly facilitated by the very frequent trains passing through the station and by the well organized and numerous stage coaches running to the principal points of interest.

Tennis, and other games, balls, concerts, good theatrical companies and other entertainments, all combine to render the season very lively for those who care for such amusements, whilst there are several good reading rooms and lending libraries for the more studious.

Such then are the many advantages presented by the climate, town and attractions of Harrogate. Although other favourable factors may be wanting, still, all the main ones are represented, and above all, the healthy conditions, which are so often practically absent in foreign spas.

## CHAPTER V

### THE MINERAL WATERS AND BATHS.

In Harrogate and its neighbourhood over 80 mineral water springs occur, and only within the last few days others have been brought to light. There are a considerable number of quite distinct chemical types of these waters which often rise quite close together, an association common enough in active volcanic districts but rare elsewhere. These waters may be classified into natural groups, a method very convenient in order to the more precise comprehension of their therapeutic action. I have found this grouping an exceedingly useful help for the memory and also in prescribing, for it is then easy to first decide upon the particular group likely to suit the general illness, and after select the variety in that group most applicable to the particular case. Taking for example the saline sulphur groups, we can choose a spring that has in one case a predominance of sulphur compounds over the saline, or vice versa, or we

can choose concentrated or dilute examples of either. To place this classification in a comprehensive form I have arranged the following table.

IRON	WATERS	Strong chloro-saline
		Mild chloro-saline
SULPHUR	WATERS	Sulphate-saline
		Pure ferruginous
		Strong chloro-saline
		Mild chloro-saline
		Chloro-carbonated alkaline
		Pure sulphur

It is thus evident that the 80 or 90 springs of Harrogate fall into eight distinct groups, which may not only again be split up into minor varieties by the predominance of one or other solid constituent, but almost into additional groups, dependent on the presence of lithium, barium, strontium, etc.

Harrogate stands pre-eminent as the possessor of three mineral waters superior to those of any other European spa. The « Old Sulphur Well » water is the strongest sulphurous water known, due no doubt to the low temperature at which it issues from the earth, and to its containing the more stable alkaline sulphides as well as hydrogen sulphide. In like manner this locality possesses both sulphur and iron waters, the richest in

barium so far known. Finally its «Chloride of Iron» spring is unique.

All the waters are practically cold, a very great advantage, for the gases are thus more easily retained. For bathing purposes the water is passed through a « Therma » or heating coils devised by Mr Hayton Davis the consulting chemist to the Municipality. This is done at the moment the water flows into the bath, so that the liberation of the gaseous constituents of the waters takes place to a large extent in actual contact with the patients skin.

For drinking purposes, several of the waters are warmed, when they are ordered to be so taken, and occasionally it is found convenient to mix two varieties together.

To give as clear an idea as possible, I have reduced the best analyses of the principal springs to decimal measures, units per thousand or grammes per litre, so that at a glance one can form a clear mental conception of any supposed compound in every litre or thousand parts of water. By doing away with our barbarous nineteenth century survival of « Standard Measures » of grains per gallon, an easy comparison is made with continental waters which are always given in decimal proportions,

We have practically no knowledge whatever of

## ANALYTICAL TABLE OF THE PRINCIPAL HARROGATE MINERAL WATERS REDUCED TO DECIMAL MEASURES.

Grammes per litre of Water or fractions per 1000	SULPHUR GROUP.						IRON GROUP.								
	Old Sulphur Well Royal Pump Room (Thorpe)	Strong Sulphur Montpelier (Atfield)	New or Mild Sulphur R. Pump Room (W. A. Miller)	Mild Sulphur Montpelier (Atfield)	Magnesia (Muspratt)	Starbeck Spa (Fairley)	Harlow Carr (Muspratt)	Kissengen Spa (Atfield)	Chloride of Iron Spa (Thorpe)	Alexandra Chalybeate Davis	Carbonate of Iron Spa (Muspratt)	Pure Chalybeate Royal Pump (Davis)	Tewitt Well (Hofmann)	John Well or (Old Spa)	Alum Well (Davis)
Organic matter . . . . .	—	—	—	—	—	—	—	—	—	0.020714	0.010714	0.009471	trace	—	—
Silica . . . . .	0.010014	0.051	0.034285	0.054800	0.022971	0.046714	0.018757	0.051000	0.020200	0.009642	0.002914	0.007171	0.014871	trace	—
Ferrous chloride . . . . .	—	—	—	—	—	—	—	0.137000	0.188757	0.082857	0.086314	0.019485	0.019400	0.018157	—
Ferrous carbonate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.990428
Ferrous sulphate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.125142
Ferric sulphate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.278142
Aluminium sulphate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Manganese chloride . . . . .	—	—	—	—	—	—	—	—	—	trace	—	—	—	—	—
Calcium chloride . . . . .	0.623357	1.141942	0.238571	0.447085	—	—	0.024328	1.247671	1.343071	—	0.033014	—	—	—	—
Calcium sulphate . . . . .	—	—	—	—	—	—	0.026857	—	—	0.129957	0.108928	0.010700	0.009957	0.004385	0.813000
Calcium carbonate . . . . .	0.42525	0.125	—	0.238728	0.263942	0.143000	0.150014	0.126542	—	0.196600	0.004871	0.021885	0.020500	0.032342	—
Barium chloride . . . . .	0.0938	—	trace	—	0.017457	trace	—	—	0.074342	—	—	—	—	—	—
Barium sulphate . . . . .	—	0.005971	—	—	—	—	—	0.007271	0.003171	—	—	—	—	—	—
Barium carbonate . . . . .	—	—	—	—	—	—	—	0.030514	—	—	—	—	—	—	—
Strontium chloride . . . . .	trace	0.040228	—	0.008842	trace	—	—	0.012671	0.008914	—	—	—	—	—	—
Strontium sulphate . . . . .	—	0.007557	—	0.013042	—	—	—	—	—	—	—	—	—	—	—
Magnesium chloride . . . . .	0.639728	0.828414	0.034142	0.394128	0.025600	—	0.074242	0.934157	0.818785	0.067642	0.187828	—	—	trace	—
Magnesium bromide . . . . .	0.03257	—	—	—	trace	trace	trace	trace	trace	trace	trace	0.027885	0.038100	0.043414	—
Magnesium iodide . . . . .	0.001614	—	—	—	trace	trace	trace	trace	trace	trace	trace	—	—	—	0.819714
Fluorides . . . . .	—	—	—	—	—	—	—	0.054728	—	—	—	—	—	—	—
Magnesium sulphate . . . . .	—	—	—	—	—	—	0.050142	0.019242	—	0.082642	—	—	—	—	—
Magnesium carbonate . . . . .	0.085042	—	trace	trace	0.182842	—	—	trace	trace	trace	trace	0.027885	0.038100	0.043414	—
Lithium chloride . . . . .	0.01075	trace	trace	—	0.009371	trace	trace	—	trace	trace	trace	trace	trace	—	—
Ammonium chloride . . . . .	0.01472	0.014228	—	—	—	—	—	0.006271	0.005860	—	—	—	—	—	0.031285
Ammonium sulphate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potassium chloride . . . . .	0.137028	0.068728	0.162000	0.081300	0.398757	—	0.008571	0.306071	0.045785	0.016142	0.002142	—	0.018900	—	0.044857
Potassium sulphate . . . . .	—	—	—	—	—	—	0.009285	0.008614	—	—	—	0.003742	0.015100	0.014157	—
Potassium carbonate . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sodium nitrate . . . . .	—	0.012857	—	0.005285	—	—	—	—	—	—	—	—	0.004000	0.022042	0.485142
Sodium chloride . . . . .	12.76671	11.819571	8.327857	5.554285	3.084228	1.663428	0.050185	9.637114	3.965157	2.519571	0.166428	0.023214	—	0.019114	—
Sodium carbonate . . . . .	—	—	—	—	—	—	0.206714	0.219714	—	—	—	0.015757	—	—	—
Sodium sulphhydrate . . . . .	0.0745	—	0.008428	—	—	—	0.010100	0.019425	0.050614	—	—	—	—	—	—
Sodium sulphide . . . . .	—	0.207142	—	0.125385	0.010100	0.019425	—	—	—	—	—	—	—	—	—
Total Solids . . . . .	14.955083	14.322638	8.895283	6.932251	4.005897	2.165565	0.679009	12.496252	6.845710	3.125767	0.592439	0.140553	0.150299	0.153611	5.634424
Sulphuretted hydrogen . . . . .	0.056652	—	0.023304	—	—	—	—	—	—	—	—	0.097880	0.084418	0.106502	—
Carbon dioxide . . . . .	0.285665	0.427430	0.094176	0.384688	0.081926	—	0.042742	0.151737	0.381481	0.121390	—	—	—	0.000393	—
Carburetted hydrogen . . . . .	—	—	0.006024	—	0.002096	—	—	—	—	0.001596	—	0.004224	0.002060	0.003450	—
Oxygen . . . . .	—	—	0.006742	0.009096	0.014481	—	0.036204	0.023533	—	0.040638	—	0.036204	0.025025	0.028736	—
Total mineral constituents by weight	15.307400	14.762834	9.021859	7.333516	4.087823	2.165565	0.757955	12.679249	7.227191	3.289391	0.592439	0.278861	0.261802	0.292692	5.634424
Gases in cub. centimetres per litre															
Sulphuretted hydrogen . . . . .	36.602	—	15.059	—	—	—	—	—	—	—	—	—	—	—	—
Carbon dioxide . . . . .	144.464	216.156	47.626	194.541	41.430	—	21.615	76.735	192.919	61.388	—	49.499	42.691	53.859	—
Carburetted hydrogen . . . . .	—	8.286	—	2.882	—	—	—	—	—	—	—	—	—	0.540	—
Oxygen . . . . .	—	—	13.328	7.241	11.528	—	28.821	18.734	—	32.351	—	28.821	19.922	22.876	2.413
Nitrogen . . . . .	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total gases by volume .	181.066	237.770	69.926	208.951	41.430	—	50.436	100.873	192.919	94.855	—	81.274	64.054	79.688	—

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Elementary Constituents Present in the Principal Harrogate Waters.

Parts per 1000, or grammes per litre	SULPHUR GROUP.					IRON GROUP.				
	Old Sulphur Well (Thorpe)	Montpelier Strong Sulphur (Attfield)	Montpelier Mild Sulphur (Attfield)	Mild Sulphur R. Pump Room (W. A. Miller)	Magnesia Spa (Muspratt)	Montpelier Kissengen Spa (Attfield)	Chloride of Iron Spa (Bothamley)	Alexandra Chalybeate (Davis)	Pure Chalybeate R. Pump Room (Davis)	
Potassium . . .	·0709	·0360	·0425	·0827	·2077	·1602	·0239	·0084	·0028	
Sodium . . .	4·9940	4·7720	2·2591	3·8100	1·2185	3·7889	1·5536	·9981	·0072	
Ammonium . . .	·0004	·0048	·0031	trace	·0021	0019	trace	trace	trace	
Barium . . .	·0611	·0035	trace	trace	·0115	·0255	·0506	—	—	
Strontium . . .	trace	·0258	·0111	·2643	·1055	·0070	·0049	·1168	·0200	
Calcium . . .	·3903	·4615	·2566	·2643	trace	trace	trace	trace	faint trace	
Lithium . . .	·0017	trace	trace	trace	·0587	·2360	·2066	·0374	·0074	
Magnesium . . .	·2006	·2093	·1000	·1400	—	·0661	·1587	·0400	·0093	
Iron . . .	—	·0028	trace	—	trace	—	·0060	trace	—	
Manganese . . .	—	·0064	·0068	—	—	·0030	·0013	·0917	·0066	
Sulphates . . .	—	·0093	·0038	—	—	—	—	—	—	
Nitrates . . .	—	·0093	·0038	—	—	—	—	1·5900	·0128	
Chlorides . . .	8·6724	8·5823	4·0000	5·6200	2·1006	7·5000	4·2369	·2200	·0524	
Carbonates . . .	·3125	·0780	·1436	·2410	·2890	·1560	·0812	trace	—	
Sulphides . . .	·0933	·0849	·0514	·0562	·0041	trace	·0042	trace	—	
Bromides . . .	·0280	trace	trace	trace	trace	trace	·0042	trace	—	
Iodides . . .	·0014	trace	trace	·0343	·0230	·0510	·0201	·0096	·1106	
Silica . . .	·0099	·0510	·0548	—	—	—	—	—	—	
	15·0036	14·3276	6·9328	9·7485	4·0126	12·4960	6·8221	3·1120	·1283	

RADICALS OF

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the chemical state of different elements in solution, so that the grouping of the different substances, determined in practical analysis into this or that compound, is based upon purely hypothetical grounds. It is no doubt useful to use such an arrangement in prescribing, but it should always be accompanied by a table of the percentage of bases and acids, as found by analysis. This has been done in the present instance for the most renowned springs, as shown in the second table.

In the first table of the hypothetical saline constituents, these have been grouped according to their bases, where these latter are the important therapeutic agent in the salt, whereas those in which the radicle is the active substance, the compounds containing such are placed together.

The gases by weight are added so as to show the total mineralization of the water, and beneath they are again given by volume (\*).

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(\*) For the preparation of the first table I am much indebted to the help of my wife and my friend Major Warren Frith, R. A., who both kindly relieved me of much of the very long and tedious calculations necessary. I must express by deep gratitude to Mr Hayton Davis for preparing the second table, the labour represented by which is really enormous.

## CHAPTER VI.

### CASES FOR TREATMENT AT HARROGATE.

It is a recognized fact that only chronic, or acute diseases extending over a long period, which though not chronic may be looked upon as such, are fit and proper ones to be sent to take the waters. In fact hydrotherapeutic treatment is most applicable to those cases where nutrition, metabolism or excretion are at fault. These deranged physiological processes constitute the main elements in most chronic diseases and it is in great part by righting these, that baths and drinking the water bring about a cure.

Of these diseases the gout and rheumatism group stand out pre-eminent. If treatment be adopted as a preventive measure, the milder saline sulphur water acts in a marvellous manner. The alterative action of the sulphur, its marked stimulating effect upon the liver, skin and lungs, clears and restores the deranged functions of these organs, whilst the chloro-alkaline constituents stimulate metabolism

generally, improve appetite and digestion, excite the bowels and augment the amount of urine and the elimination of the various forms of uric acid and its salts. In the graver examples of these diseases, the congested or even chronically inflamed state of different organs is removed, molecular uric deposits redissolved and excreted, whilst fibrous tissues are poisoned and irritated by such deposits, regain in part their normal state. Old exudations of joint capsules, thickened ligaments and tendons with their sheaths as well as those of the muscles, facias, aponueroses, gland capsules, fibrous trabecular frameworks and tubular sheaths, so far return to normal as is compatible with permanent tissue changes, organized new deposits, growth or destruction of tissue. It is absurd to expect an anchylosed joint to regain its normal mobility and use, but much can be done to restore it to an extent compatible with the vital reparatory powers of Nature, which really execute the work when directed by the physician or more properly the practical physiologist.

The sulphur water used as hot plunge, douche, spray or other baths, combined with massage, excites skin circulation, removing congestion, and stimulating the sweat glands to increase their functional activity.

Not an uncommon result of mineral water treat-

ment is to set up an acute attack of gout, and a sharp daily look-out should be made to stop temporarily the waters and adopt suitable treatment. This phenomenon is not one that should lead to an unfavourable prognosis but quite the contrary; it is, however, a warning to medical advisers not to send their patients to a spa without local advice and supervision. In fact, in a considerable number of cases it is undoubtedly due to the patient not being subjected to a graduated treatment advancing from feeble to more active measures as the way clears.

In the same manner the numerous manifestations of the rheumatic or gouty state are markedly improved by the simple sulphur or chloro-alkaline sulphur water, such as dyspepsia, constipation, uric dysentery or colitis, hepatitis, haemorrhoids, chronic pharyngitis, tonsilitis, laryngitis, bronchial catarrh, bronchitis, pleurisy, chorea, neuralgia, locomotor, ataxy, certain peripheral paralyses, endo- and pericarditis and arteritis, dilated capillaries especially about the head with symptoms threatening apoplexy, certain forms of nephritis, eczema, psoriasis, rheumatic nodes, and many others too numerous to mention.

It would be out of place here to discuss the chemical, biological, and physiological aspects of these two disease groups; still more is this the

case when we conceive that it is no long time since we passed from the empirical to the hypothetical stage of our knowledge concerning them, and it is but lately that we can say we have advanced to the first steps of the theoretical stage. Speaking generally, both these disease groups depend on defective digestion, assimilation, imperfect oxidation or reduction, or incomplete excretion. In some individuals it appears to be only one of these processes at fault, but far more often, two or even all are performed in a perverted or imperfect manner.

Our most successful treatment must therefore be in the correct determination of the presence and character of these pathological phenomena and their rational correction. Any method that combines such correction with an improvement of the local manifestations and without doing injury to the system in general, must necessarily be the most preferable. It is for this reason that cloro-alkaline sulphur waters offer such great advantages over ordinary drugs when used in a more condensed form. Add to this the climatic and dietetic advantages that can be fulfilled at a spa, then we have the obvious explanation of the renown that mineral-water-stations have acquired in the treatment of gout, rheumatism and their allies.

On the same lines much good can be obtained

in chronic or old serous deposits about the pericardium, pleurae, etc. whilst it is most marked in the stages of simple peritoneal exudations or in localized forms such a perimetritis, perityphlitis, etc. Likewise thickenings and chronic congestion or exudative crusts on the cerebro-spinal meninges are greatly ameliorated, and cirrhosis of the liver and kidneys as well as fibroid degeneration of other structures are also benefited by these sulphur waters.

Chronic metritis, ovaritis, prostatitis, cystitis, etc. are likewise much improved by a course of the sulphur water, and calculous deposits show enormous improvement by a course of the "Magnesia spring".

In old wounds and other traumatic lesions with thickened painful scars, chronic exudations, feeble sloughy ulcers, stiffened points, rigid ligaments and tendons, periostitis, caries and necrosis, the douching, massage and water drinking, by improving the physiological environment and constitutional state, rapidly restore the sufferers to health.

Of some skin diseases we have already spoken. Even where no gouty origin can be found for eczema, much good often accrues, but the results are generally not so brilliant. Impetigo, the first stage of acne rosacea, chronic migratory erysip-

elas, lichen and most of the parasitic skin diseases are suitable for treatment by the Harrogate sulphur water.

After their use in the treatment of gout and rheumatism, chloro-alkaline sulphur waters are most known for the remarkable effect they exert on scrofula and glandular tubercle, with the numerous other lesions depending on that state. Scrofulous or tubercular diseases of glands, viscera, skin, mucous membranes, bones and joints, and especially chronic abcesses are influenced in a remarkable manner at Harrogate. No doubt this is in great part due to the climate and hygiene, but the saline sulphur, water followed, where necessary, by the iron waters, is the main agent in bringing about the remarkable recoveries. Special attention must be drawn to the "Strong Sulphur Well" and the "Chloride of Iron" water which are, for Barium, the highest mineralized waters known. It is more than a century that the great value the salts of this base have been known to have in the treatment of scrofula.

It has also been said that rickets are benefited by sulphur waters, but I am inclined to refer the result more to the climate and individual hygiene than the waters.

Much the same may be said of phthisis. Therapeutically the sulphides are often of much use, and the chlorides stimulate the appetite, digestion,

and the excretion of the animal poisons absorbed from the tubercular ulcers, but climate and hygiene contribute more to the improvement or recovery. No doubt the dry bracing climate of Harrogate constitutes a useful summer sojourn for such patients, but they should quit it and get settled in their winter quarters not too late in the autumn.

Syphilis with its innumerable manifestations gives very good results where iodides are being simultaneously prescribed, but the use of sulphur waters during the exhibition of mercury would not be carried out by any physician who recalls his chemistry.

It is in part for the reason that insoluble sulphides are formed, that these sulphur waters are so useful in metallic poisoning from mercury, lead arsenic, etc., and in part the improvement of the general health by cleansing the system, that such sufferers are benefited.

Finally these waters are of great use in a large number of gastro-intestinal and hepatic troubles quite independent of gout or rheumatism. In these cases those springs such as the "Old Sulphur Well" that are rich in Barium, and above all, Strontium, ranking as the richest waters containing these substances known, are very valuable. The recent researches on Strontium and its great use in certain diseases of the stomach render some

of the Harrogate springs most suitable for the treatment of those disorders.

The cases that are unfitted for Harrogate Sulphur waters, are those patients suffering from atheroma, and fatty degeneration in general, aneurism, cardiac valvular incompetency with fatty degeneration, not due to gout or rheumatism, all forms of haemorrhage, acute fevers, acute skin diseases and active syphilis.

Passing on to consider the employment of the iron waters, we have to determine in the different cases whether we choose the saline chalybeate, simple chalybeate, or the chloride of iron and barium water. Each of the first two of these types occur at Harrogate in different grades of dilution, so that in a given patient it is often useful to employ different springs progressively, so as to obtain, if required, tolerance of even large doses of the strongest.

In the convalescent stage from fevers, other grave illness, or after prolonged treatment with sulphur waters, it is often of great benefit to submit the patient to one or other of these iron waters.

In simple anaemia dependent on bad hygiene or general malnutrition, the simple chalybeate or the Chloride of Iron water should be chosen, and especially the last, where there is any scrofulous

tendency. In anæmia, accompanied by passive hæmorrhages in general, much good may be expected from the simple chalybeate and the iron chloride water, whilst the saline chlorides should be avoided as diminishing the coagulating power of the blood at the ends of the bleeding vessels. It is, however, otherwise with chlorosis, which, usually dependent on bad hygienic and moral training, tight-lacing, perverted modesty, etc. has led to imperfectly performed functions in general, combined with marked constipation. According to my own views, at the age at which this complaint occurs, certain conditions seem to exist, which favour a special kind of fermentation in the retained fœces, in which sulphuretted hydrogen and probably organic compounds of sulphur are formed. The sulphur compounds in the first place precipitate all the iron components in the food and so render them insoluble and incapable of absorption. Besides the iron starvation of the blood, the ferruginous constituents of the red corpuscles likewise enter into composition with the fermentation sulphur compounds that are absorbed from the intestines into the circulation. We have a somewhat similar effect in slow sulphuretted hydrogen poisoning. Now iron given in this disease performs a two or even three-fold purpose—a chemical precipitant, an antiseptic, and an inorganic food. The excess of

iron introduced, goes to decompose and render harmless the sulphur compounds set free in the intestines, and so allows the organic iron constituents of food to be assimilated. It probably acts as an antiseptic, arresting the production of the anæmogenic compounds, and finally a portion is absorbed and goes to regenerate the hæmoglobin (\*).

It is a fact well known to the practical physician that the administration of even large quantities of iron alone, does but little good in chlorosis, whilst in small doses combined with a purgative, often most marked improvement takes place. This it seems to me can be explained by the large doses impairing digestion, increasing the constipation, and acting as an astringent and irritant to the intestines, whilst certain portions of food, not thoroughly mixed with the iron, still undergoes the anæmogenic fermentation. This fermentation seems only to occur in fœces retained beyond the regular time, so that the stimulation of the bowels by purgatives to evacuate their contents

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(\*) The good effect of arsenic in such cases can be explained in the first place by its tonic effect and by the antiseptic action of arseniuretted hydrogen or other arsenical compounds set free in the intestines.

prevents the occurrence of this fermentation. The pernicious effect of purgatives when long continued in, is but too well known, so that when the same effect can be brought about in an equally satisfactory manner by the saline constituents of the iron waters, the great advantage is obtained of introducing no abnormal physiological substance into the alimentary canal. The dose also can be so arranged as not to overstep the poison limit of iron; by which I mean the limit at which it begins to do harm.

As a matter of fact, the effect of the saline chalybeates in the cure of chlorosis is marvellous. No doubt the social, moral, climatic and hygienic change does much to help the medicinal treatment, without which it is far less effectual, but nevertheless the waters are the most important element in bringing about the result.

Convalescence from almost any serious illness will be rendered more speedy and complete if a course of iron waters be prescribed. Generally in such cases the simple chalybeates will be found most useful, but where morbid products must be absorbed, recourse will be had to the saline chalybeates. It is also advisable to prescribe some of these iron waters after a course of the sulphur springs, especially if a little anaemia has been set up by these latter.

In most haemorrhages the astringent iron springs free from salines are the most adapted to this class of cases, but where such discharges are the result of general, or local plethora as in haemorrhoids, all these iron waters are best avoided.

In menstrual and uterine disturbances, which are so variable in their nature, much good may be done in some cases, whilst harm would accrue in others. To detail such cases would be out of place here in the short space at our disposal.

A similar remark applies to disturbances or diseases of the gastro-intestinal canal.

Such then, in as compact a form as possible, is a general review of those cases fit or unsuitable for treatment at Harrogate, so that the overworked family physician may, without plunging deeply into the therapeutics of the different springs of that town, know what cases to send there. It is for the local medical man to judge of and order the more detailed treatment and watch its results. It is by an almost specialization and constant observation, that one acquires the practical knowledge of what to do in any given case, which, the ordinary practitioner can hardly hope to obtain. There are one or two points that should be carefully attended to in sending patients to Harrogate. They should bring a short account of their case and especially of the treatment they have

been subjected to. They should not be allowed to go there without some local advice, and take the « waters » indiscriminately. They should be warned to attend to diet, exercise, and other advice given them by the local physician, and not be allowed to believe that *however much they neglect themselves* the *waters* will miraculously bring about a complete cure in a few days, perhaps of a malady that has worried them for years.



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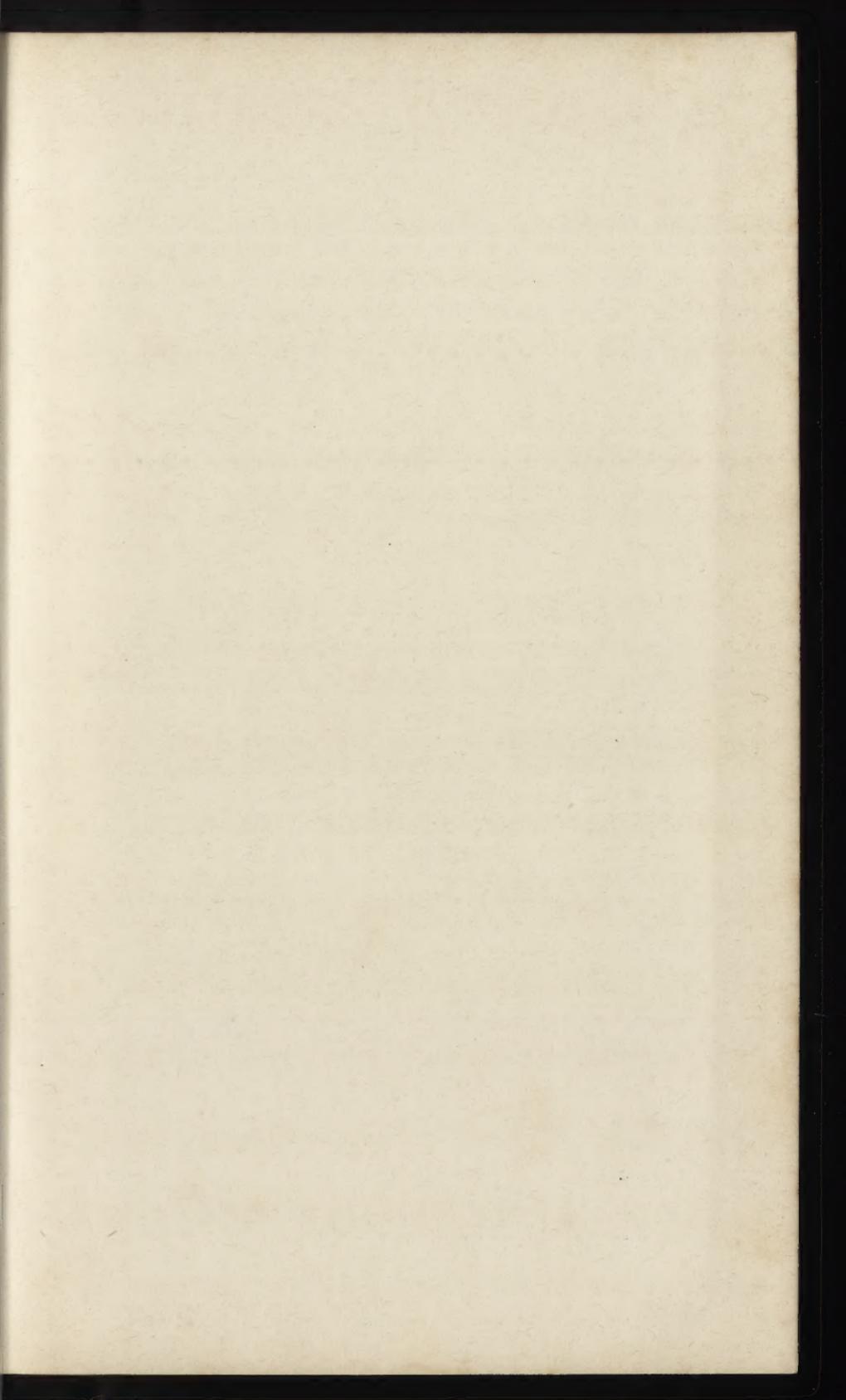
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